Status Report on TRANSIMS Development

LaRon L. Smith

Los Alamos National Laboratory

January 12, 2000

Topics

- Portland Studies
- Research Activities
- Commercialization

Relationships Between Research, Portland Study, and Commercialization

- **Issues and requirements of the Portland study define and motivate necessary TRANSIMS-LANL developments.**
- **Research and development activities and tasks are designed to create, verify, and demonstrate the functionality required by the study problem.**
- **Completion of the study problem underwrites the relevance and applicability of the newly developed software and methods in a tangible demonstration of TRANSIMS capabilities.**
- **Successful completion and demonstration of the new technologies and methodologies in an integrated transportation analysis system offsets the risk to commercialization.**
- **The schedule for technology transfer to the public sector is tightly coupled with completion of the research and the Portland study.**

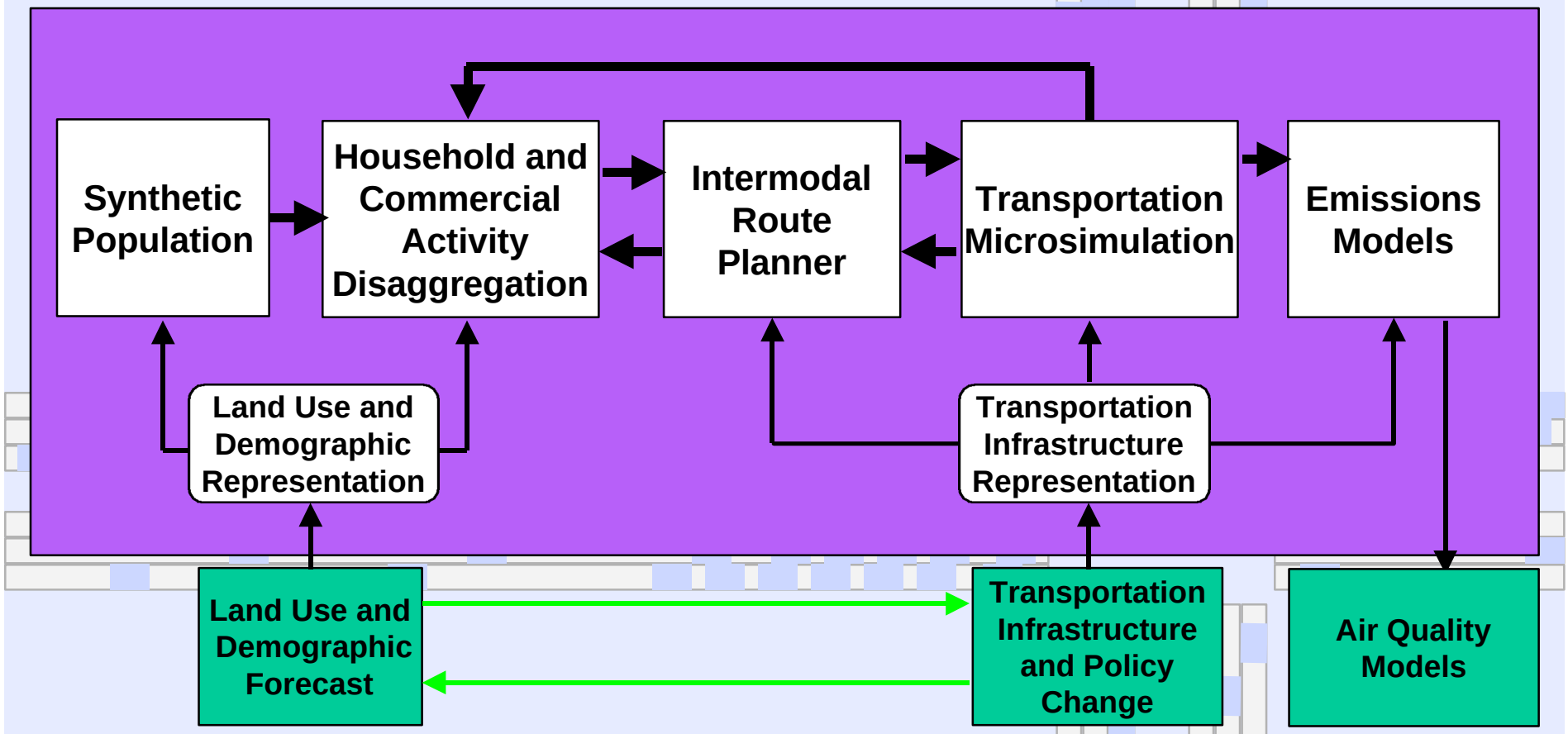
Portland Study

- Validation against Portland 1996/1997 observed data.
- 1996/1997 Representation.
  - Forecasted 1996/1997 block group demographics.
  - 1990 PUMS.
  - 1994 Activity Demand Survey.
  - 1996/1997 Transportation Network.
  - 1996/1997 Land Use.
- Features
  - Traveler/household definition.
  - Activities.
  - Routing of intermodal travel.
  - Traffic and transit.
  - Complex feedback methods.
  - Additional MOEs (emissions, accidents)

Portland Network

- **EMME2 network (20,000 links) used for testing and research**
  - **Currently autos only (at LANL)**
  - **Adding transit (TRANSIMS format)**
- **120,000 link Allstreets network**
  - **600 timed signals**
  - **400 actuated signals**
  - **2000 signalized intersections with no information**
  - **Adding transit stops, routes, schedules**
  - **Testing lane connectivities**

TRANSIMS Architecture



Synthetic Population

- **Generates households and individuals for base census year (1990)**
- **Household vehicle assignments**
  - **Number of vehicles from PUMS**
  - **Portland's vehicle types used for MOBILE5**
- **Being modified to generate a population based on Portland's projection to any year, but in particular for 1996-1997.**
  - **Block group 3-way distribution (age, income, household size)**

Activity Demand

- **For each household, provides a list of activities to be refined with feedback.**
- **Determines discrete activity locations based on attractiveness and travel time.**
- **Modifying to improve selections of activity locations, mode choice, and vehicle assignment.**
- **Adding hooks to allow for feedback.**
- **Feedback research will adjust**
  - **Activity locations**
  - **Activity times**
  - **Mode choice**
  - **Activity list, if necessary**

Trip Tables

- **Capability exists to generate trip plans from time-dependent origin-destination (O-D) tables.**
- **Portland non-freight itinerant traveler O-D information for external-external, external-internal, internal-external, and internal-internal trips.**
- **Portland freight itinerant traveler O-D information in passenger car equivalents for external-external, external-internal, internal-external, and internal-internal trips.**

Intermodal Route Planner

- **Finds the minimum generalized cost path under the mode constraints.**
- **Modes (Walk, Bus, Auto/Truck, Light rail (complete, but not tested))**
- **Multi-modal and intermodal trips**
  - **Park and Ride (works but needs testing and further work on behavior)**
- **Runs extremely fast.**
- **Modifying interface with activity generator and microsimulation to allow shared rides.**
- **Examining methods to allow parking at parking locations not associated with activity locations.**
- **Developing methods to account for parking lot capacities, possibly using feedback.**

Microsimulation

- **Second-by-second simulation of travel execution.**
- **Modes (Walk (delay based on m/s), Autos (s-by-s), Buses (traveler loading/unloading, queues), Trucks).**
- **Timed signals.**
- **Traffic behavior calibrated to Highway Capacity Manual.**
- **Testing detector representations.**
- **Generic signals (completed, testing mostly complete, may be refined)**
- **Testing Portland bus mall weaving.**
- **Completing light rail development and testing.**
- **Adding different acceleration profiles for buses and trucks.**
- **Completing capability to handle shared rides, including interfaces with planner.**

Emissions Model

- **Calculates emissions for light-duty vehicles.**
- **Uses Comprehensive Modal Emissions Model.**
- **Output formatted for MODELS3**
- **Completing heavy duty emissions development (UWV models).**
- **Completing filter to extract data for cold starts.**
- **Completing calibration to ramp behavior.**

Output Subsystem

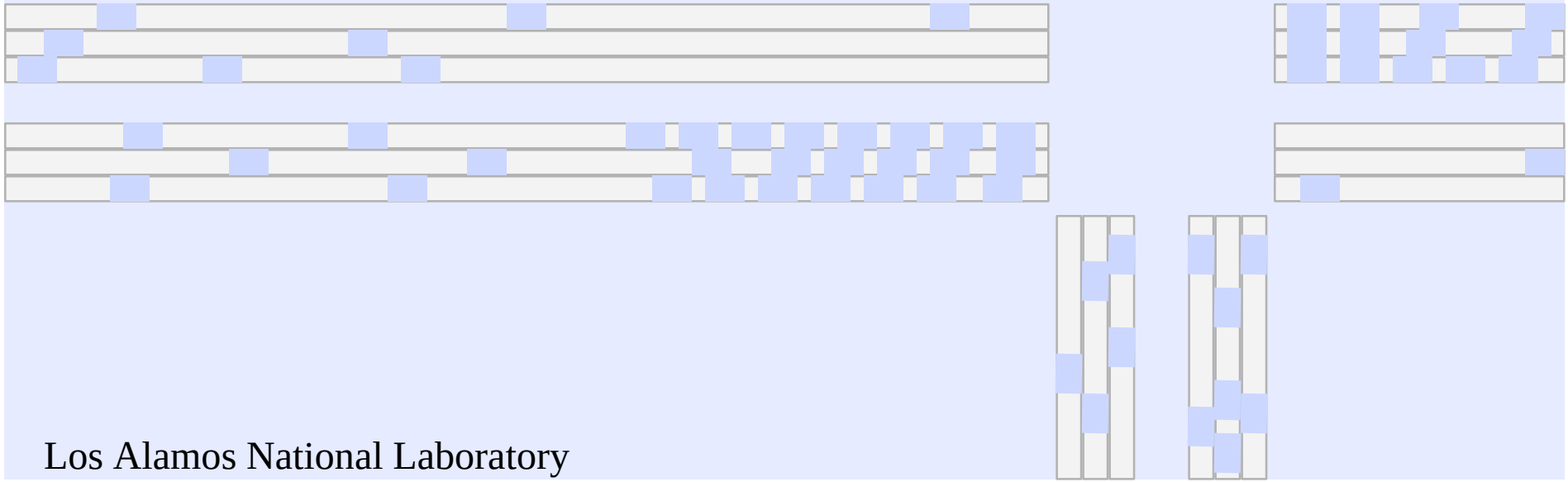
- **Development Basically Complete**
  - **Traveler events**
  - **Snapshot data**
  - **Summary data**
- **Supports traditional and innovative Measures of Effectiveness.**
- **Minor modifications for emissions model input.**

Feedback

- **Feeds back Microsimulation link travel times to Intermodal Route Planner.**
- **Completing development to allow feedback to the Activity Demand Generator.**
- **Research underway to “match” travel plan expectations with observed executed travel.**
- **Research to adjust activities for planned and executed travel (feedback from both the Microsimulation and the Intermodal Route Planner).**
- **Research to feed back route plan information to the Intermodal Route Planner to accelerate convergence.**

Framework

- **Protocols for data movements defined.**
- **Developing selector methodologies (e.g., feedback strategies).**



Further Research

- **Local street representations**
- **Transform current practices or develop new technologies for forecasted transit systems.**
- **High occupancy vehicles**
  - **Inter-household shared rides**
  - **High occupancy vehicle lanes**
  - **Effect on feedback strategies**
- **Intelligent Transportation Systems**
  - **Ramp metering**
  - **Electronic tolls**
  - **Traveler information systems**
- **Pricing policies (generalized costs)**

Commercialization

- **Opportunity Forum, June 28-30, 1999**
- **Request for Proposals issued August 13, 1999.**
  - **Transform TRANSIMS products into commercial products.**
  - **Implement TRANSIMS-DOT at Early Deployment Transportation Planning Organizations.**
  - **Support Early Deployment Transportation Planning Organization transition plans.**
  - **Viable Business Plan.**
- **Several proposals received by November 19, 1999.**
- **Source selection process underway.**
- **Anticipate contract award March-April 2000.**

Summary

- **TRANSIMS development is driven by an application in the real world (Portland study).**
- **The Portland study will authenticate TRANSIMS' relevance and applicability, reducing its risk for commercialization.**
- **TRANSIMS development is scheduled to support both the Portland study and technology transfer to the commercialization process.**